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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/826,757	04/15/2004	Brad A. Reger	5693P037X	1208
48102	7590	04/20/2007	EXAMINER	
NETWORK APPLIANCE/BLAKELY 12400 WILSHIRE BLVD SEVENTH FLOOR LOS ANGELES, CA 90025-1030			WALTER, CRAIG E	
			ART UNIT	PAPER NUMBER
			2188	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		04/20/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/826,757	REGER ET AL.
	Examiner	Art Unit
	Craig E. Walter	2188

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 02 February 2007.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-16 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) 14-16 is/are allowed.
 6) Claim(s) 1-13 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ . | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

Status of Claims

1. Claims 1-16 are pending in the Application.

Claims 13 and 14 are amended.

Claims 1-13 are rejected.

Claims 14-16 are allowable.

Response to Amendment

2. Applicant's amendments and arguments filed on 2 February 2007 in response to the office action mailed on 27 October 2006 have been fully considered, but they are not persuasive. Therefore, the rejections made in the previous office action are maintained, and restated below, with changes as needed to address the amendments.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by DeKoning et al. (US Patent 5,975,738), hereinafter DeKoning.

As for claim 1, DeKoning teaches a method comprising:

operating a storage system which includes a plurality of mass storage

devices and a first storage server head to access the mass storage devices in response to client requests, wherein the first storage server head has ownership of the plurality of mass storage devices (referring to Fig. 1, the RAID subsystem (100), contains a plurality of controllers (i.e. heads – 118.1, 118.2), connected to a plurality of mass storage devices (110). The controllers receive access requests via the hosts (120.1, 120.2) – col. 6, lines 9-40. Each LUN within the array of storage devices is associated (i.e. assigned) to one of the two controllers as primary controller. The remaining controller is the secondary or redundant controller – col. 7, lines 13-22); and

reassigning ownership of at least one of the mass storage devices to a second storage server head, independently of a manner in which the second storage server head is connected to the plurality of mass storage devices (the redundant controller assumes ownership of the LUNs if a failure is detected in the primary controller –col. 7, lines 23-31).

As for claim 5, DeKoning teaches the reassigning ownership of at least one of the mass storage devices comprises using a software-based command to reassign ownership of said at least one of the mass storage devices (the determination if ownership needs to be reassigned is performed via a process of exchanging software commands as per col. 3, lines 43-64).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 7-9, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeKoning (US Patent 5,975,738) as applied to claim 1 above, and in further view of Dimmick et al. (US Patent 5,193,050), hereinafter Dimmick.

As for claims 2 and 7, DeKoning teaches a method of reconfiguring a storage system, the method comprising:

operating an integrated storage system which includes a plurality of mass storage devices and a storage server head to access the mass storage devices in response to client requests, wherein the storage server head has ownership of the plurality of mass storage devices (referring to Fig. 1, the RAID subsystem (100), contains a plurality of controllers (i.e. heads – 118.1, 118.2), connected to a plurality of mass storage devices (110). The controllers receive access requests via the hosts (120.1, 120.2) – col. 6, lines 9-40. Each LUN within the array of storage devices is associated (i.e. assigned) to one of the two controllers as primary controller. The remaining controller is the secondary or redundant controller – col. 7, lines 13-22);

disconnecting and removing the storage server head from the mass storage devices (the controllers are interchangeable so as to allow a failing controller unit to be easily disconnected and removed from the storage subsystem (col. 6, line 63 through

col. 7, line 12));

connecting an external storage server head unit to the mass storage devices (DeKoning teaches connecting both a primary and a secondary controller to the storage subsystem. Once it has been determined that the primary controller has failed, the connection between the secondary controller and the storage units is enabled allowing for control to pass to the secondary controller – col. 7, lines 13-31. It is worthy to note that external storage controller (i.e. head) is in fact external, as it is external to the drives as shown in Fig. 1);

and using a command to reassign ownership of the plurality of mass storage devices from the storage server head to the external storage server head unit (the determination if ownership needs to be reassigned is performed via a process of exchanging software commands as per col. 3, lines 43-64).

DeKoning however fails to teach the storage server head and storage devices as being installed in a chassis (as recited by Applicant in both claims 2 and 7).

Dimmick however teaches an enclosure for electronic subsystems in a data processing system, which he teaches the use of a single enclosure (i.e. chassis) incorporating several individual modules to form an integrated subsystem for data processing systems (col. 1, lines 7-11) – see also Fig. 1.

As for claim 12, though DeKoning teaches a storage server head (i.e. controller), he fails to specifically teach it as being implemented on a single circuit board. It would have been obvious to one of ordinary skill in the art at the time of the invention for DeKoning to integrate his controller (i.e. the CPU, memory and cache which comprise

the controller) onto a single circuit board. By doing so, he could exploit the well-known benefits of integrated circuits utilizing a single circuit board, including improved interchangeability, and improved signal timing and integrity of the components.

DeKoning additionally fails to teach installing the controller within the chassis as recited by Applicant. Dimmick however teaches an enclosure for electronic subsystems in a data processing system, which he teaches the use of a single enclosure (i.e. chassis) incorporating several individual modules to form an integrated subsystem for data processing systems (col. 1, lines 7-11) – see also Fig. 1.

As for claim 13, though DeKoning teaches removing a failed controller and swapping it with another controller, he fails to teach swapping these controller within the chassis itself.

Dimmick however teaches an enclosure for electronic subsystems in a data processing system, which he teaches the use of a single enclosure (i.e. chassis) incorporating several individual modules to form an integrated subsystem for data processing systems (col. 1, lines 7-11) – see also Fig. 1.

It would have been obvious to one of ordinary skill in the art at the time of the invention for DeKoning to further include Dimmick's enclosure for subsystems into his own subsystem utilizing his method for detecting failures in a redundant controller. By doing so, DeKoning could benefit by having a fully integrated unit, capable of being quickly inserted and removed without requiring any changes to the remainder of the system as taught by Dimmick in col. 1, lines 28-40.

As for claim 8, DeKoning teaches using a command to reassign ownership of the

plurality of mass storage devices as comprising reassigning ownership of the mass storage devices independently of how the plurality of mass storage devices and the external storage head unit are physically interconnected (the redundant controller assumes ownership of the LUNs if a failure is detected in the primary controller –col. 7, lines 23-31. Also note the determination to reassigned ownership is performed via a process of exchanging software commands as per col. 3, lines 43-64).

As for claim 9, DeKoning teaches using a command to reassign ownership of the plurality of mass storage devices as comprising reassigning ownership of the mass storage devices without removing any of the mass storage devices (unlike his teachings for the controllers which are interchangeable, DeKoning does not require that the drives themselves be swapped out during the reassignment process (i.e. reassignment may occur either via software commands, or via physical swapping of the controllers)).

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over DeKoning (US Patent 5,975,738) as applied to claim 5 above, and in further view of Brunelle et al. (US Patent 6,654,902 B1), hereinafter Brunelle.

As for claim 6, though DeKoning teaches arbitrating ownership of a plurality of disks between multiple controllers, he fails to specifically teach storing ownership attribute bits in the disks themselves.

Brunelle however teaches a system for persistent reservation IO barriers in which a storage device itself stores an ownership identifier depending on which resource (i.e. computer) has access to that device (col. 2, lines 21-51).

It would have been obvious to one of ordinary skill in the art at the time of the

invention for DeKoning to further include Brunelle's system of persistent reservation IO barriers into his own method for detecting failure in redundant controllers using a private LUN. By doing so, DeKoning could exploit the benefits of preventing unauthorized access to his system by increasing the system's security via Brunelle's use of a registration key as taught by Brunelle in col. 1, lines 33-51.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of DeKoning (US Patent 5,975,738) and Dimmick (US Patent 5,193,050) as applied to claim 7 above, and in further view of Brunelle (US Patent 6,654,902 B1).

As for claim 10, through the combined teachings of DeKoning and Dimmick meet all the limitations of claim 7, they fail to specifically teach storing ownership attribute bits in the disks themselves.

Brunelle however teaches a system for persistent reservation IO barriers in which a storage device itself stores an ownership identifier depending on which resource (i.e. computer) has access to that device (col. 2, lines 21-51).

It would have been obvious to one of ordinary skill in the art at the time of the invention for DeKoning to further include Brunelle's system of persistent reservation IO barriers into his own method for detecting failure in redundant controllers using a private LUN. By doing so, DeKoning could exploit the benefits of preventing unauthorized access to his system by increasing the system's security via Brunelle's use of a registration key as taught by Brunelle in col. 1, lines 33-51.

7. Claims 3, 4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable

over the combined teachings of DeKoning (US Patent 5,975,738) and Dimmick (US Patent 5,193,050) as applied to claims 2 and 7 above, and in further view of Weber (US PG Publication 2003/0105931 A1).

As for claim 3, though the combined teachings of DeKoning and Dimmick teach all the limitations of claim 2, they fail to teach the second sever head as being external to the chassis.

Weber however teaches an architecture for transparent mirroring which utilizes a redundant controller, remote from the primary controller (see Fig. 1, element 106 and paragraph 0027, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for DeKoning to further include Weber's mirroring method into his own method for detecting failure in redundant controllers using a private LUN. By doing so, DeKoning could benefit by preventing catastrophic system failure by mirroring critical data at a geographically remote location, hence enabling persistent access to critical uncorrupted data as taught by Weber in paragraphs 0001 and 0006, all lines.

As for claim 4, DeKoning teaches removing the failing unit once it's detected in order to transfer ownership to the redundant controller (col. 6, line 63 through col. 7, line 12).

As for claim 11, though the combined teachings of Dekoning and Dimmick teach all the limitations of claim 7, they fail to teach connecting the external storage server head unit to a second plurality of mass storage devices, wherein the external storage server head unit further has ownership of the second plurality of mass storage devices.

Weber however teaches an architecture for transparent mirroring, which utilizes a redundant controller, remote from the primary controller connected to mirrored data storage devices (see Fig. 1, element 106 and paragraph 0027, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for DeKoning to further include Weber's mirroring method into his own method for detecting failure in redundant controllers using a private LUN. By doing so, DeKoning could benefit by preventing catastrophic system failure by mirroring critical data at a geographically remote location, hence enabling persistent access to critical uncorrupted data as taught by Weber in paragraphs 0001 and 0006, all lines.

Allowable Subject Matter

8. Claims 14-16 are allowed.
9. The following is a statement of reasons for the indication of allowable subject matter:

As for claim 14, though the combined teachings of DeKoning and Dimmick teach all of the elements in common with claim 7, they fail to teach each of the plurality of heads as having ownership of a different subset of the plurality of mass storage devices, and each of the mass storage devices as being owned by exactly one of the storage server heads, wherein each of the storage server heads is implemented on a separate, single circuit board. Furthermore, DeKoning in view Dimmick fails to teach installing a plurality of input/output modules in the chassis in a space previously occupied by the separate, single circuit boards and connecting a plurality of external

storage server head units to the mass storage devices installed in the chassis via the input/output modules as recited in this claim.

Claims 15 and 16 further limit claim 14 therefore they too are deemed allowable.

Response to Arguments

10. Applicant's arguments have been fully considered but they are not persuasive.

As for claim 1, Applicant contends, "DeKoning does not teach or suggest reassigning ownership of at least one mass storage device, of a plurality of mass storage devices, to a second storage server head, independently of a manner in which the second storage server head is connected to the plurality of mass storage devices, as recited in claim 1". Applicant further asserts, "DeKoning is focused on how a failure is detected, not on how takeover is accomplished. As such, DeKoning does not disclose what kind of mechanism is used to reassign disk ownership. The section cited by the Examiner, col. 7, lines 23-31, merely states that takeover by one controller occurs if the other controller fails, but is completely silent regarding how disk ownership is reassigned during takeover. Neither is any disclosure or suggestion found anywhere else in DeKoning of reassigning disk ownership independently of a manner in which the RDAC is connected to the disks".

This argument however is not persuasive. More specifically, Applicant defines "independently of a manner in which the second storage server head is connected to the plurality of mass storage devices" as "independently of the cabling configuration between the disks and the heads" as per paragraph 0037 of the original specification.

Additionally, Applicant contrasts this definition with the prior art, in which the ownership reassignment is determined “entirely by the cabling configuration between the disks and the heads” (emphasis added). Applicant continues, “Note that the conversion process could be carried out in a system which does not implement disk ownership in this manner; however, the process would be more complicated, since **it would require more extensive recabling between devices to implement the desired disk ownership scheme**” (emphasis added) as per paragraph 0037 of Applicant’s original specification. Examiner properly construed DeKoning’s teachings of “reassigning ownership of at least one of the mass storage devices to a second storage server head, independently of a manner in which the second storage server head is connected to the plurality of mass storage devices” by giving this recitation its “broadest reasonable interpretation consistent with Applicant’s specification” pursuant to MPEP § 2111. More specifically, it is clear from the previously cited lines (col. 7, ll. 23-31) that the reassignment process is contingent upon a *sensed failure in the operation of the primary controller*. This process occurs *irrespective* of the actual connection of the disks and the head, hence the takeover occurs *independently* of the connections between the head and disks.

Applicant concludes, “[f]urthermore, one cannot reasonably conclude that such functionality is inherent in the system of DeKoning, nor that such functionality would be obvious based on DeKoning. To the contrary, in the known prior art the usual way in which disk ownership was assigned was dependent on the physical connections between the server heads and the disks (see paragraph [0015] of Applicants’

specification). If any assumption can be made about DeKoning, it is that the takeover process mentioned therein is dependent upon how the RDACs are connected to the disks. See, for example, Figures 1 and 2 of DeKoning, both of which show (or at least clearly imply) that each RDAC is operatively coupled to each disk; there is no indication in DeKoning that takeover could be accomplished if that were not so".

This argument is however not persuasive. Referring again to paragraph 0037 of Applicant's original specification (as per the discussion *supra*), the prior art (i.e. wherein ownership is dependant on the cabling configuration) is determined "entirely by the cabling configuration between the disks and the heads". Nowhere in DeKoning's teachings is there an indication, either implicitly or explicitly, that the reassignment is contingent upon the wiring configurations as depicted in Fig. 1 and Fig. 2. The wiring configurations as disclosed in these figures are such that if a failure is sensed in the primary controller, a take-over may occur. Again this process occurs irrespective of the actual connection of the head to the disks, hence this take-over process functions *independently* of the wiring.

As for claim 7, Applicant contends, "Dimmick discloses an enclosure for various functional modules, which may include multiple tape drives 200. However, Applicants find no disclosure or suggestion in Dimmick that a storage server head may also be contained within that enclosure. The Office has conceded that DeKoning does not disclose this feature. For at least this reason, therefore, the cited combination fails to teach or suggest all of the limitations of claim 7".

This argument however is not persuasive. More specifically, Examiner clearly established in the previous rejection (referring to Examiner's paragraph 005) that DeKoning teaches both a storage server head and a plurality of mass storage devices (see Fig. 1, col. 6, ll. 9-40 and col. 7 ll. 13-22), and that Dimmick teaches an enclosure for electronic subsystems in a data processing system. Dimmick's system uses a single enclosure (i.e. chassis) to incorporate several individual modules to form an integrated subsystem for data processing subsystems (see col. 1, lines 7-11 and Fig. 1 of Dimmick). Examiner further maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention for DeKoning to further include Dimmick's enclosure for subsystems into his own subsystem utilizing his method for detecting failures in a redundant controller. By doing so, DeKoning could benefit by having a fully integrated unit, capable of being quickly inserted and removed without requiring any changes to the remainder of the system as taught by Dimmick in col. 1, lines 28-40. In other words, the combination of DeKoning and Dimmick would result in an integrated storage system comprising at least one storage server head and a plurality of mass storage devices within a chassis, hence rendering the claim as a *whole*, obvious.

Lastly, Applicant contends, "[c]laim 7 is directed to a technique of converting a standalone ("integrated") storage server (i.e., a storage server in which a storage server head and mass storage devices are all contained in a single chassis) into a "dumb" mass storage device box and then enabling a separate, external storage server head to assume ownership of the mass storage devices within that box. There is not even a

remote suggestion or motivation to accomplish this in either DeKoning or Dimmick or in the prior art in general".

This argument however is not persuasive. It appears that Applicant attempted to set forth an argument that DeKoning and Dimmick's teachings are not analogous art. Pursuant to MPEP § 2141.01(a), "The examiner must determine what is "analogous prior art" for the purpose of analyzing the obviousness of the subject matter at issue. "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned."

In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992)".

Examiner maintains that DeKoning and Dimmick are *both* within Applicant's field of endeavor (configuration and reconfiguration of storage systems with DASD devices) and are both reasonably pertinent to the particular problem with which the inventor was concerned (both DeKoning and Dimmick provide systems for forming an integrated storage system able to accommodate device failures with the aid of multiple modules).

Examiner further maintains that an initial *prima facie* case of obviousness was properly established pursuant to MPEP § 2141.02, paragraph I in the previous Office action.

More specifically, MPEP § 2141.02 paragraph I. Recites, "In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983). The combination of DeKoning and Dimmick as a

whole were fully considered with respect to Applicant's instant claim, as a whole. Examiner further maintains that each of the four Graham v. John Deere Co. factual inquires set forth in MPEP § 2141 were properly applied against the instant claim, hence Examiner has met the burden of providing a *prima facie* case of obviousness.

The rejections previously set forth against the pending dependant claims are maintained since no substantive rebuttal of Examiner's proper establishment of a *prima facie* case of anticipation and/or obviousness has been previously set forth.

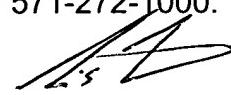
Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).
12. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.
13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig E. Walter whose telephone number is (571) 272-8154. The examiner can normally be reached on 8:30a - 5:00p M-F.

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14. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung S. Sough can be reached on (571) 272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

15. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Craig E Walter
Examiner
Art Unit 2188

CEW



HYUNG SOUGH
SUPERVISORY PATENT EXAMINER
4-18-07